UNITED STATES DISTRICT COURT
FOR THE
DISTRICT OF VERMONT

UNITED STATES OF AMERICA	)	
	)	
	)	
v.	)	Case No. 2:15-cr-17
	)	
EUGENIA EMERSON and	)	
JESSE EMERSON	)	

FINDINGS OF FACT

To determine contested drug quantity for the purposes of sentencing in the above-captioned cases, the court held an evidentiary hearing on March 1, 2016 and March 4, 2016 at which the following witnesses testified: Dr. Thomas DiBerardino, Dr. Cassandra Prioleau, Dr. Jonathan Lipman, David Harrison, Heather McBrearty, Teanna Record, Detective Sergeant Patrick Call, and Vermont State Police Lieutenant Daniel Trudeau.

The issue before the court is the proper marijuana equivalency for alpha-pyrrolidinopentiophenone ("a-PVP"). The government bears the burden of establishing the contested drug quantity by a preponderance of the evidence. *See United States v. Colon*, 961 F.2d 41, 43 (2d Cir. 1992) (holding that where the quantity of drugs is contested, the government has the burden to establish by a preponderance of the evidence the quantity attributable to defendant).

The impact of the court's determination on the appropriate marijuana equivalency for a-PVP is significant. If Defendants prevail with their argument, Defendant Eugenia Emerson will have a base offense level of 28 based on heroin attributed to her, which she does not contest, but no additional drug quantity due to the a-PVP. Defendant Jesse Emerson will have a base offense level of 8.

The court makes the following findings of fact by a preponderance of the evidence:

1. Defendants have pled guilty to, among other things, conspiracy to distribute a-PVP.

2. a-PVP is not specifically referenced in the November 2015 edition of the Sentencing Guidelines Manual. Pursuant to Application Note 6 to USSG § 2D1.1, in the case of a controlled substance that is not specifically referenced in the Sentencing Guidelines, the court must determine the base offense level using the marijuana equivalency most closely related to a controlled substance referenced in the Sentencing Guidelines.

3. In order to make the "most closely related" determination, to the extent practicable, the court must conduct a three prong analysis:

> Prong A: whether the controlled substance not referenced in the Sentencing Guidelines has a chemical structure that is substantially similar to a controlled substance referenced in the Sentencing Guidelines.
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> Prong B: whether the controlled substance not referenced in the Sentencing Guidelines has a stimulant, depressant, or hallucinogenic effect on the central nervous system that is substantially similar to the stimulant, depressant, or hallucinogenic effect on the central nervous system of a controlled substance referenced in the Sentencing Guidelines.
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> Prong C: whether a lesser or greater quantity of the controlled substance not referenced in the Sentencing Guidelines is needed to produce a substantially similar effect on the central nervous system as a controlled substance referenced in the Sentencing Guidelines.

4. The government asks the court to find that a-PVP is most closely related to methcathinone, which is specifically referenced in the Sentencing Guidelines and which has a marijuana equivalency of 380 grams per one gram of methcathinone.

5. Defendants ask the court to find that a-PVP is most closely related to pyrovalerone, which is a Schedule V controlled substance not specifically identified in the Sentencing Guidelines. The Drug Quantity table set forth in USSG § 2D1.1 provides a marijuana equivalency of 0.00625 grams for one unit of a Schedule V Substance. Application Note 8(B) to USSG § 2D1.1 provides that "[f]or certain types of controlled substances, the [marijuana] equivalencies in the Drug Equivalency Tables are 'capped' at specific amounts[.]" The note provides that the combined weight of all Schedule V controlled substances shall not exceed 2.49 kilograms of marijuana.

6. The court declines to find *United States v. Moreno*, 2015 WL 6071680 (W.D. Wisc. Oct. 15, 2015), persuasive insofar as it concludes that pyrovalerone

cannot be deemed the "most closely related" controlled substance to a-PVP simply because it is not specifically mentioned in the Sentencing Guidelines. *See id.* at *3 ("The court reject[s] defendants' primary argument that pyrovalerone was an appropriate comparator" to a-PVP because, even though a-PVP "is structurally similar to pyrovalerone, and perhaps more closely similar to pyrovalerone than to methcathinone[,] . . . [it] is not referred to in the [Sentencing G]uideline[s]"). The Sentencing Guidelines specifically reference Schedule V drugs as a source of marijuana equivalency and thus pyrovalerone should be considered for the "most closely related" determination, consistent with the rule of lenity. *See United States v. Ketchen*, 2015 WL 3649486, at *16 (D. Me. June 11, 2015) (observing that pyrovalerone is not specifically referenced in the Sentencing Guidelines but nonetheless analyzing it under the "most closely related" test and concluding "[b]ased on the evidence now before the [c]ourt, the [c]ourt finds that the [g]overnment has demonstrated that MDPV is a 'controlled substance analogue' to methcathinone, a Schedule I controlled substance, and the [c]ourt finds that the evidence does not support the [d]efendants' assertion that MDPV is a 'controlled substance analogue' to pyrovalerone").

Prong A: Chemical Structure

7. Methcathinone, like a-PVP, is a synthetic cathinone, and both are Schedule I controlled substances. Cathinones are stimulants that are similar to amphetamine. The government's expert witness, Dr. DiBerardino, credibly opined that of the controlled substances specifically identified in the applicable Sentencing Guidelines, methcathinone is the substance that has a chemical structure most closely related to the chemical structure of a-PVP. He further credibly opined that the core chemical structure of a-PVP and methcathinone is phenethylamine. In addition, a-PVP and methcathinone are both substituted at the beta-position of the phenethylamine core with an oxygen atom, classifying them as beta-keto-phenethylamines or cathinones. Both a-PVP and methcathinone are substituted with an alkyl group at the alpha-position of the phenethylamine core, and both a-PVP and methcathinone are substituted with an alkyl group at the nitrogen (N) atom of the phenethylamine core. a-PVP and methcathinone thus share the same core chemical structure and are both substituted at the alpha-position, beta-position, and on the nitrogen (N) atom. Methcathinone is the only controlled substance listed in the Sentencing Guidelines that is classified as a beta-keto-phenethylamine or cathinone. In comparing the chemical structures for a-PVP and methcathinone, the difference in their chemical structures is minor. Therefore, a-PVP is substantially similar in chemical structure to methcathinone.[1]

[1] The DEA's findings support the conclusion that methcathinone is substantially similar in its chemical structure to a-PVP. The DEA Deputy Administrator found that a-PVP is structurally and pharmacologically similar to amphetamine, MDMA, cathinone, and other related substances.

8. Pyrovalerone is also a stimulant similar to amphetamine that was formerly prescribed in the United States as an anti-depressant. It is no longer prescribed in the United States, but it is prescribed elsewhere for lethargy and asthma. Dr. Lipman, Defendants' expert witness, credibly opined that the most closely related controlled substance in terms of structure to a-PVP is pyrovalerone. The molecular structures of both are elaborations of the beta ketone phenethylamine structure (which can also be classified as a cathinone), and both pyrovalerone and a-PVP can be characterized as analogs of methcathinone. Both Dr. DiBerardino and Dr. Lipman agree that the chemical structure of a-PVP is more similar to pyrovalerone than it is to methcathinone.

9. The court finds that both methcathinone and pyrovalerone satisfy Prong A of the Sentencing Guidelines test for the "most closely related" determination, as both have chemical structures that are substantially similar to a-PVP. However, a-PVP is more similar to pyrovalerone in its chemical structure than it is to methcathinone. In so finding, the court acknowledges that the Sentencing Guidelines require only that a-PVP be substantially similar in its chemical structure to a controlled substance referenced in the Sentencing Guidelines and not the most similar among comparable drugs.

Prong B: Pharmacological Effects

10. With regard to Prong B, the government's expert witness, Dr. Prioleau, credibly testified that a-PVP is a stimulant that affects the central nervous system in a manner that is substantially similar to other stimulants including methcathinone. Both substances produce certain common desired effects (e.g., increased energy, euphoria) and adverse effects (increased heart rate, paranoia, insomnia). Both drugs are potentially toxic, addictive, and fatal. The government has therefore sustained its burden to demonstrate that a-PVP's effect on the central nervous system is substantially similar to methcathinone's.[2]

11. With regard to Prong B, Dr. Lipman credibly testified that both pyrovalerone and a-PVP are stimulants which produce a similar impact on the central nervous system and that both achieve their pharmacological effect through a norepinephrine and dopamine reuptake inhibitor mechanism. Dr. Lipman stopped short, however, of opining that the pharmacological effects of a-PVP and pyrovalerone are more similar to one another, than the pharmacological effects of a-PVP and methcathinone.

12. In instructing the court to engage in a three prong analysis to determine which drug is "most closely related" to a-PVP "to the extent practicable," the Sentencing Guidelines do not contemplate a court delving into a qualitative and

[2] The DEA findings also support this conclusion and note that many synthetic cathinones such as a-PVP produce pharmacological effects substantially similar to Schedule I substances such as methcathinone.

quantitative analysis of peer reviewed studies to determine which provides the best evidence from which the court can then deduce which substance is more similar to the drug in question in its pharmacological effects. At best, based on a review of the studies and the expert witnesses' testimony, the court concludes that there are gaps in the evidence which render any more precise comparison of the pharmacological effects of methcathinone[3] and pyrovalerone[4] not practicable. In other words, there is no reliable evidence that would allow the court to conclude that either methcathinone or pyrovalerone is "more similar" to a-PVP's pharmacological effects on the central nervous system in humans.

13. The court concludes that Prong B of the analysis is satisfied by both methcathinone and pyrovalerone with no basis for concluding that one is more similar to a-PVP than the other.

Prong C: Potency

14. With regard to Prong C, the dosage/potency test, Dr. Prioleau credibly opined that a-PVP is at least as potent as methcathinone. Dr. Prioleau reached this conclusion based on *in vivo* studies that examined the dosage required to prompt laboratory animals to press a lever reflecting that they were indicating a response to a known drug of abuse. These *in vivo* tests revealed that a-PVP and methcathinone substitute for methamphetamine at approximately the same dosage and therefore approximately the same quantity of these drugs is necessary to achieve a substantially similar stimulant effect on the human central nervous

[3] The government relies on *in vivo* (animal studies) drug discrimination studies which compared the pharmacological effects of a-PVP and methcathinone to cocaine and methamphetamine. In these studies, laboratory rats were trained to distinguish between cocaine and a placebo and methamphetamine and a placebo. The rats were then provided a-PVP and methcathinone. These studies reveal that a-PVP, like methcathinone, produces the same stimulus effect produced by methamphetamine in rats. These studies did not address pyrovalerone, and thus they provide no basis to make a comparison with that drug.

[4] There is a relatively recent *in vitro* (test tube) study that demonstrates that pyrovalerone and a-PVP have a similar effect on two of three human transporters—the dopamine and norepinephrine transporters but not the serotonin transporter. This is the Rickli study, "Monoamine Transporter and Receptor Interaction Profiles of Novel Psychoactive Substances: Para-halogenated amphetamines and Pyrovalerone Cathinones." The Goldberg study, "Self-Administration of Drugs in Animals and Humans as a Model and Investigative Tool," found this same correlation although it did not address the serotonin transporter, which the Rickli study includes. Neither study provides a basis for concluding that, in humans, pyrovalerone is more similar to a-PVP than methcathinone is in its pharmacological effects. As Dr. Prioleau credibly testified, *in vitro* studies provide some predictive support for a comparison, but they do not provide a reliable conclusion without *in vivo* testing to predict the results in humans. In any event, a-PVP's comparison to pyrovalerone in the Rickli study is not a favorable one because the study finds that pyrovalerone is likely associated with significant stimulant-type effects and toxicity and a high risk of addition.

system. The government has thus sustained its burden at Prong C to establish by a preponderance of the evidence that methcathinone is substantially similar to a-PVP in dosage/potency. Dr. Prioleau nonetheless conceded that she is aware of literature suggesting that a methyl group component to a drug's chemical structure increases its potency due to its solubility and its ability to penetrate the blood-brain barrier. Consistent with this awareness, she acknowledges that methamphetamine (which contains a methyl group in its chemical structure) is more potent than amphetamine (which does not).

15. Dr. Lipman opined that it would take a large dosage of pyrovalerone to approximate a-PVP, but he is not aware of a study comparing the two for purposes of potency. He cites not only the Goldberg study, but also the Meltzer study, "A Promising Class of Monoamine Uptake Inhibitors," for his conclusion that pyrovalerone is less potent than amphetamines and significantly less potent than methamphetamines. Because there are no studies providing direct comparisons of potency, he relies on the fact that methcathinone is described in its 1957 patent as less potent than amphetamine. Since pyrovalerone is clearly less potent than amphetamine in clinical studies, and since a-PVP lacks pyrovalerone's methyl group, he reasons that a-PVP would therefore be expected to be less potent than pyrovalerone. From this, Dr. Lipman opines that neither pyrovalerone nor a-PVP is more potent than methcathinone on a dose/weight/effect basis. Although this appears to be a reasonable inference, it has not been confirmed by reliable evidence. The patent itself was not provided to the court, nor were the studies that supported the factual representations contained therein. Dr. Lipman's opinion on Prong C thus remains a hypothesis that makes sense but is not reliably established. The court therefore finds that there is insufficient evidence at Prong C to reach a conclusion regarding whether the quantity of pyrovalerone necessary to produce a substantially similar effect on the central nervous system is more, less, or substantially the same as the quantity of a-PVP.

16. Although the court finds the testimony of the government's witnesses, David Harrison, Heather McBrearty, and Teanna Record, all of whom have used bath salts, helpful on the issue of the impact of designer drugs on the community and individual health, it is not clear that this testimony can be fairly used to compare a-PVP to methcathinone or any other drugs. For example, Ms. McBrearty credibly opined that she did not initially realize she had switched from smoking methamphetamine to bath salts, a street name for a-PVP. She found bath salts more addictive, but whether she was increasing the frequency and amount of her usage because of their addictiveness or because of a change in her lifestyle, or both, is not clear. She did not suffer paranoia or psychosis as a result of the bath salts, but her boyfriend did. Although they both became increasingly more aggressive, her boyfriend's aggression escalated to violence. The composition of the bath salts, the dosages, the chronicity of use, whether a-PVP was used in conjunction with other controlled substances, how it was consumed, and the

individual's pre-existing health and mental health conditions therefore all appear to play a role in determining how a-PVP will affect that individual. The court therefore does not rely on this testimony to determine drug quantity.

17. Based on the foregoing, the court concludes that only methcathinone can satisfy all three prongs of the "most closely related" test set forth in Application Note 6 to Sentencing Guideline § 2D1.1. Because the goal is to find the most closely related controlled substance in the Sentencing Guidelines to ensure that drug quantity is accurately and fairly determined, the court considers whether pyrovalerone would be otherwise appropriate as the "most closely related" drug if each prong of Application Note 6 were satisfied.

18. Dr. Lipman conceded that pyrovalerone is a dangerous and potentially fatal drug in large doses, and its adverse effects persist and continue to harm the central nervous system even after its usage ceases. It appears pyrovalerone's inclusion in DEA's Schedule V is primarily the function of a treaty. Accordingly, pyrovalerone's inclusion in Schedule V may not accurately reflect its potential for abuse, lack of medicinal use, addictiveness, or impact on human health.

19. In scheduling a-PVP, the DEA Deputy Administrator found that a-PVP can cause acute health problems leading to emergency department admissions and violent behaviors causing harm to the user or others. In addition, a-PVP has been implicated in the death of individuals. The placement of a-PVP in Schedule I reflects the DEA Deputy Administrator's findings that a-PVP has a high potential for abuse, no currently accepted medical use in treatment in the United States, and a lack of accepted safety for use under medical supervision. These conclusions reveal that a-PVP is markedly dissimilar from other substances listed in Schedule V such as cough medicine Robitussin AC and anti-diarrheals such as Lomotil. Although the Sentencing Guidelines direct the court to consider Schedule V for marijuana equivalencies for drugs that are not specifically identified in the Sentencing Guidelines, if the court examines DEA's drug schedules, it must conclude that a-PVP is not closely related to Schedule V drugs because it was placed in Schedule I by final order dated March 7, 2014 for purposes of "avoid[ing] an imminent hazard to the public safety." 79 Fed. Reg. 12938, 12938 (Mar. 7, 2014).

20. To find a-PVP "most closely related" to pyrovalerone would also be contrary to the Sentencing Guidelines' caveat in § 2D1.1 which requires the "minimum offense level from the Drug Quantity Table for any . . . controlled substances [which are Schedule I and II stimulants (and their immediate precursors)] individually, or in combination with another controlled substance, is level 12." The Sentencing Guidelines thus evince an intent to ensure that a Schedule I controlled substance, such as a-PVP, does not yield a base offense level below 12. Here, Defendants' proposed use of pyrovalerone as the "most closely

related" drug would yield a base offense level below 12 in the case of Jesse Emerson.

21. It would produce an absurd result to find that a-PVP, a Schedule I drug, is most closely related to pyrovalerone, a Schedule V drug, when it appears that pyrovalerone is in Schedule V for reasons other than its threat to public safety and its high potential for abuse, lack of currently accepted medical use in treatment in the United States, and lack of safety for use under medical supervision. *See United States v. D'Oliveira*, 402 F.3d 130, 132 (2d Cir. 2005) (declining "to interpret the Guidelines to require . . . an absurd result"). Moreover, if the court were to find that a-PVP was "most closely related" to pyrovalerone, it would have the effect of reducing a 12 kilogram quantity of a-PVP to a 2.49 kilogram quantity of marijuana equivalency due to the conversion cap for Schedule V controlled substances. *See* USSG § 2D1.1 Application Note 8(D) (providing that the combined equivalent weight of Schedule V substances shall not exceed 2.49 kilograms of marijuana). Given the relative characteristics of a-PVP and marijuana, Defendants would receive a base level unwarranted by the facts and circumstances of this case and not contemplated by the Sentencing Guidelines. For these reasons, methcathinone remains the "most closely related" controlled substance in the Sentencing Guidelines to a-PVP.

Based on the foregoing, the court concludes by a preponderance of the evidence that the Presentence Reports for Jesse Emerson and Eugenia Emerson accurately reflect drug quantity, marijuana equivalency, and appropriate base offense levels.

Dated at Burlington, in the District of Vermont, this 10th day of March, 2016.

Christina Reiss, Chief Judge
United States District Court